Standard Operating Procedure (SOP) For Operation of PEAK Instruments T-9200S UV-Visible

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Standard Operating Procedure (SOP) For Operation of PEAK Instruments T-9200S UV-Visible Spectrophotometer

1. Purpose

To describe the correct procedure for the safe operation of the **PEAK Instruments T-9200S UV-Visible Spectrophotometer** for qualitative and quantitative analysis of samples.

2. Scope

This SOP applies to all staff and students using the spectrophotometer for laboratory practicals, research, and analytical measurements.

3. Principle

A UV-Visible spectrophotometer measures the amount of ultraviolet or visible light absorbed by a sample at a selected wavelength.

According to the Beer-Lambert Law,

A = εbc

Where:

- A = Absorbance
- ε = Molar absorptivity
- b = Path length (cm)
- c = Concentration

The absorbance is directly proportional to the concentration of the analyte within the linear range.

4. Responsibilities

The operator shall:

- Read and understand this SOP before use.
- Ensure the instrument is clean.
- Use appropriate cuvettes.
- Record all observations.
- Report instrument malfunction immediately.

5. Safety Precautions

- Wear a laboratory coat and gloves.
- Handle quartz cuvettes carefully.
- Do not look directly into the light source.
- Do not spill chemicals inside the sample compartment.
- Switch off the instrument after use.
- Clean spills immediately.

6. Equipment and Materials

- PEAK Instruments T-9200S UV-Visible Spectrophotometer
- Quartz cuvettes (190–350 nm)
- Glass cuvettes (Visible range only)
- Distilled water
- Blank solution
- Test samples
- Lint-free tissue

7. Instrument Specifications

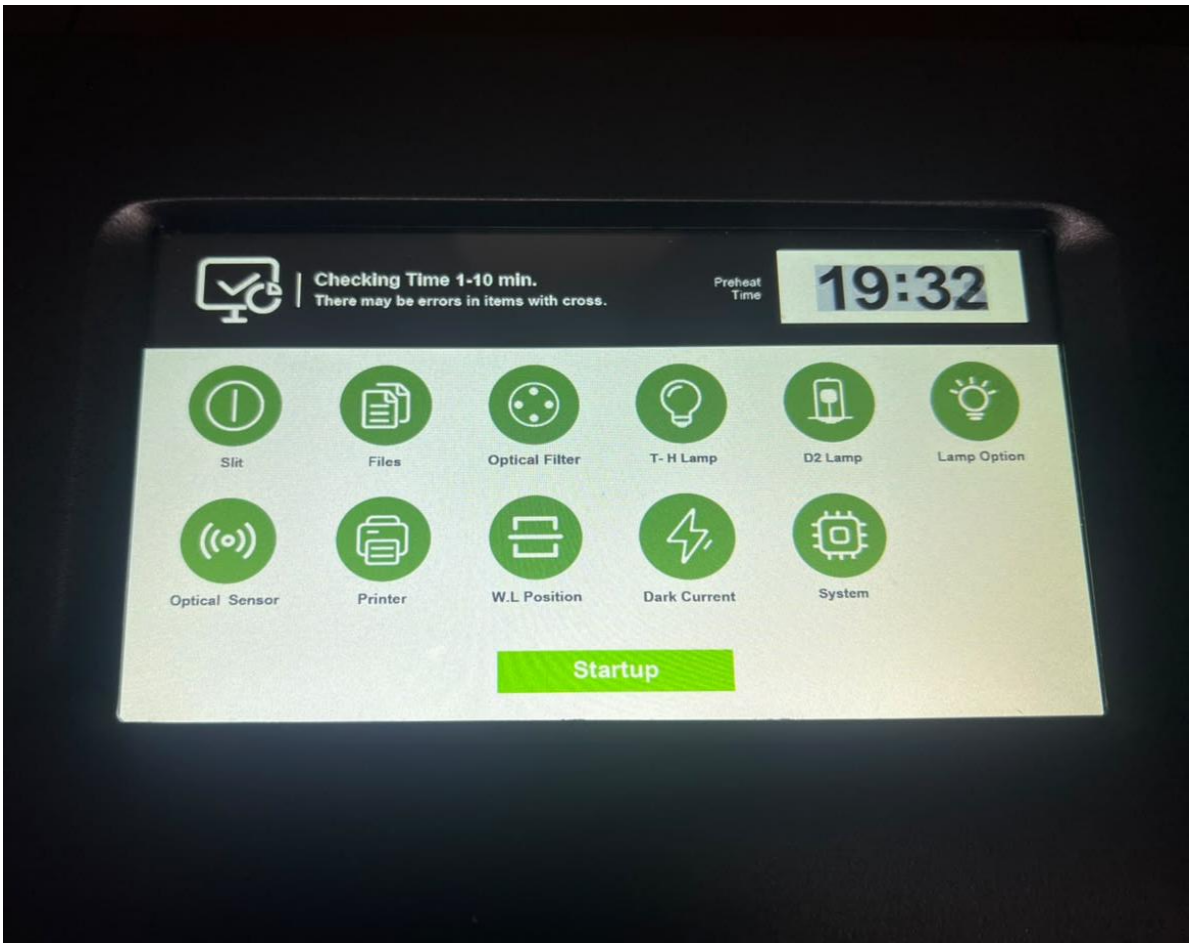
- Wavelength range: **190–1100 nm**
- Spectral bandwidth: **1 nm**
- Light source:
    - Deuterium lamp (UV)
    - Tungsten lamp (Visible)
- Detector:
    - Silicon photodiode
- Optical system:
    - Double beam
- Display:
    - 7-inch touch screen
- Measurement modes:
    - Absorbance (A)
    - Transmittance (%T)
    - Concentration
    - Spectrum Scan
    - Kinetics
    - Multi-wavelength
    - DNA/Protein analysis

8. Procedure

8.1 Before Operation

1. Ensure the instrument is placed on a stable laboratory bench.
2. Check that the power cable is properly connected.
3. Clean the sample compartment if necessary.
4. Ensure cuvettes are clean and scratch-free.

8.2 Switching On



1. Switch on the main power supply.
2. Press the power button.
3. Allow the instrument to warm up for approximately **20–30 minutes** for optimum lamp stability.
4. Wait until the home screen appears.

8.3 Selecting Measurement Mode

From the touch screen menu select the required mode:

- Photometry
- Quantitative Analysis
- Spectrum Scan
- Kinetics
- Multi-wavelength
- DNA/Protein

8.4 Setting the Wavelength

1. Select **Photometry**.
2. Enter the required wavelength.
3. Press **OK**.

8.5 Blank Measurement

1. Fill a clean cuvette with the blank solution.
2. Wipe the outside with lint-free tissue.
3. Hold the cuvette by the frosted sides.
4. Place it in the sample holder.
5. Close the lid.
6. Press **Blank** or **Zero**.
7. Wait until the display reads **0.000 Abs** or **100%T**.

8.6 Sample Measurement

1. Remove the blank.
2. Insert the sample cuvette.
3. Close the lid.
4. Press **Measure**.
5. Record:

- Wavelength
- Absorbance
- Transmittance
- Concentration (if applicable)

Repeat for additional samples.

8.7 Spectrum Scan (If Required)

1. Select **Spectrum Scan**.
2. Enter:

- Start wavelength
- End wavelength
- Scan speed

3. Insert blank and perform baseline correction.
4. Replace with sample.
5. Start the scan.
6. Save or print the spectrum if required.

8.8 DNA/Protein Measurement

1. Select **DNA/Protein** mode.
2. Insert the blank.
3. Perform blank correction.
4. Insert the sample.
5. Record:

- A260
- A280
- Concentration
- Purity ratio (A260/A280)

9. After Use

1. Remove the cuvette.
2. Empty and rinse the cuvette.
3. Clean with distilled water.
4. Dry using lint-free tissue.
5. Close the sample compartment.
6. Exit the software.
7. Switch off the instrument.
8. Switch off the main power supply.
9. Cover the instrument with the dust cover.

10. Cleaning and Maintenance

Daily

- Clean the exterior using a soft dry cloth.
- Remove spills immediately.
- Clean cuvettes after every use.

Weekly

- Clean the sample compartment.
- Check the cuvette holder.

Monthly

- Verify wavelength accuracy using calibration standards.
- Check baseline stability.

Lamp Maintenance

Replace the deuterium or tungsten lamp only according to the manufacturer's instructions when lamp performance declines or the instrument indicates replacement is required.

11. Precautions

- Always use quartz cuvettes for UV measurements.
- Glass cuvettes should only be used in the visible region.
- Never touch the transparent sides of the cuvette.
- Ensure no air bubbles are present.
- Keep the sample compartment closed during measurements.
- Do not move the instrument while in operation.
- Use clean, matched cuvettes for accurate results.

12. Troubleshooting

Problem	Possible Cause	Corrective Action
Instrument does not power on	No power supply	Check power cable and switch
High absorbance error	Incorrect blank	Re-blank the instrument
Fluctuating readings	Dirty cuvette	Clean or replace cuvette
Low absorbance	Wrong wavelength	Verify wavelength setting
Baseline drift	Lamp not stabilized	Allow sufficient warm-up time
No reading	Empty cuvette holder or improper placement	Insert cuvette correctly

13. Records

Record the following in the instrument logbook:

- Date
- Operator name
- Sample identification
- Wavelength
- Measurement mode
- Results
- Any maintenance performed
- Instrument issues or corrective actions

14. References

1. PEAK Instruments Product Information
2. PEAK Instruments UV Professional Software Manual
3. T-9200 Series User Manual.

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